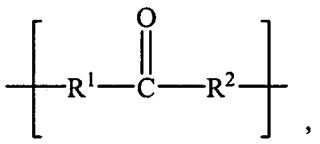
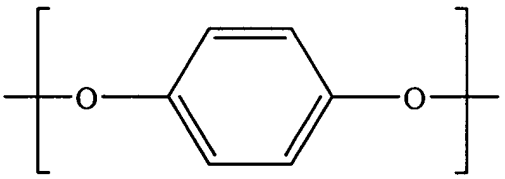
Claims:

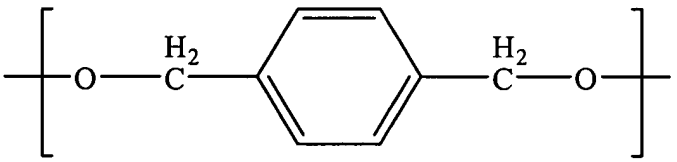
1. (Currently Amended) A polymer comprising recurring monomers having a formula selected from the group consisting of:

(I)  ,

where:

each of R^1 and R^2 is individually selected from the group consisting of functional moieties of aliphatic diols, heterocyclic diols, bisphenol A, bisphenol P,

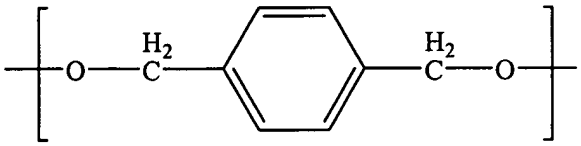
 , and

 ;

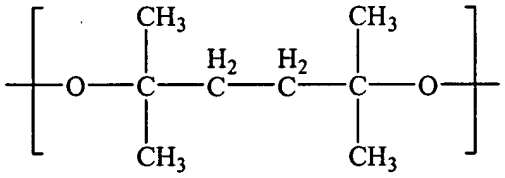
at least one of R^1 and R^2 is selected from the group consisting of functional moieties of the bisphenols A and bisphenol P; and

when one of R^1 or R^2 is a moiety of bisphenol A, the other of R^1 and R^2 is a group

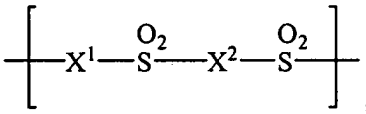
other than



or


;

(II)


,

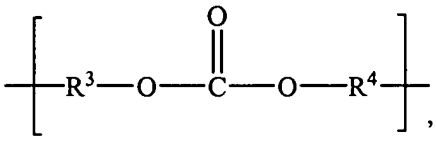
where:

X^1 is selected from the group consisting of functional moieties of diols and dioximes;

X^2 is selected from the group consisting of substituted and unsubstituted aryls and alkyls;

at least one of X^1 and X^2 includes an aromatic group; and

(III)


,

where:

each of R^3 and R^4 is individually selected from the group consisting of substituted and unsubstituted aryls and alkyls;

at least one of R^3 and R^4 includes an $-SO_2$ group; and

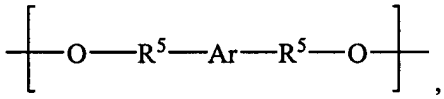
at least one of R^3 and R^4 includes an aromatic group.

2. (Currently Amended) The polymer of claim 1, wherein:

said recurring monomers have the formula (I); and

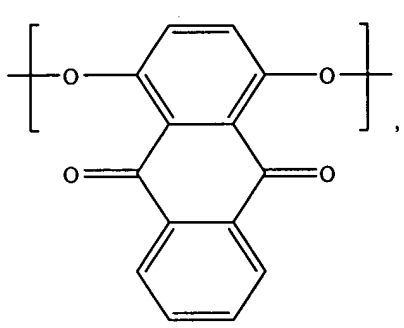
one of R^1 and R^2 is selected from the group consisting of functional moieties of bisphenol P ~~and bisphenol Z~~.

3. (Original) The polymer of claim 2, wherein the other of R^1 and R^2 has the formula



where R^5 is an alkyl group and Ar is an aryl group.

4. (Currently Amended) The polymer of claim 1, wherein said recurring monomers have the formula (I) and one of R^1 and R^2 is selected from the group consisting of



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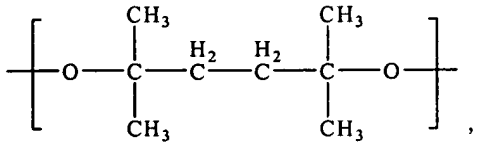

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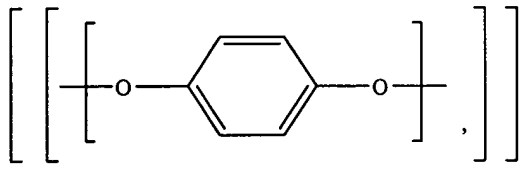

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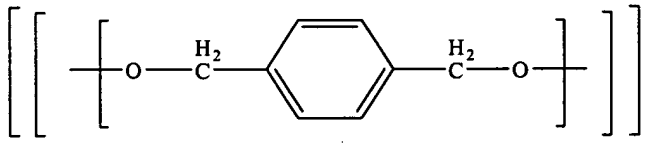
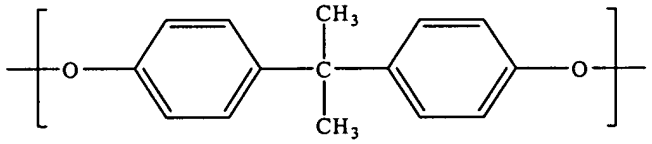


, and



.

5. (Original) The polymer of claim 1, wherein said recurring monomers have the formula (II) and X^2 is a phenyl group.

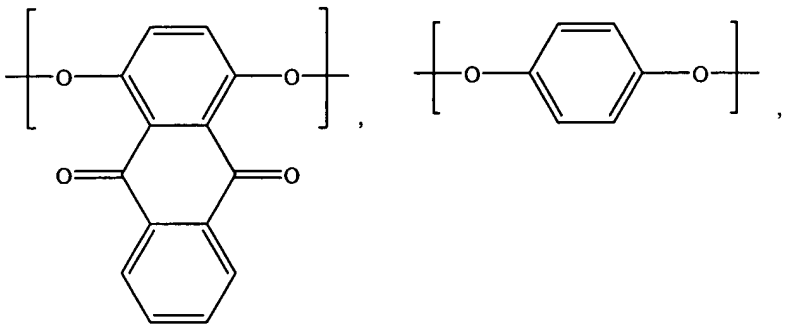
6. (Original) The polymer of claim 1, wherein:

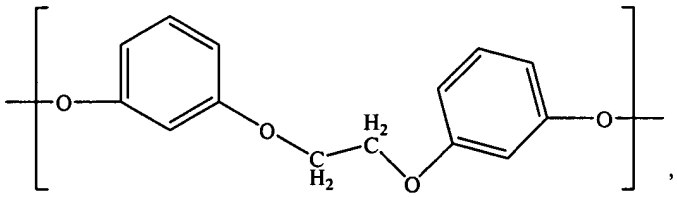
said recurring monomers have the formula (II);

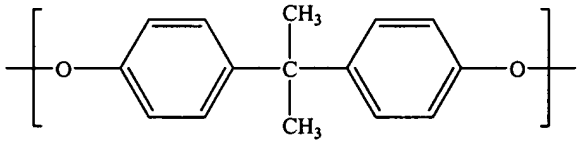
X^1 has the formula -O-Z-O-; and

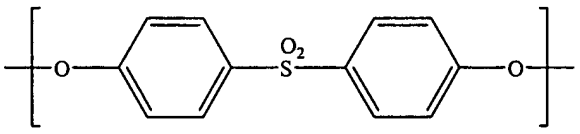
Z is selected from the group consisting of substituted and unsubstituted aryls, alkyls, and combinations thereof.

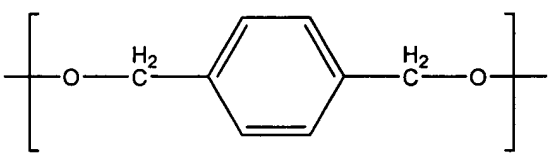
7. (Original) The polymer of claim 6, wherein X^1 has a formula selected from the group consisting of







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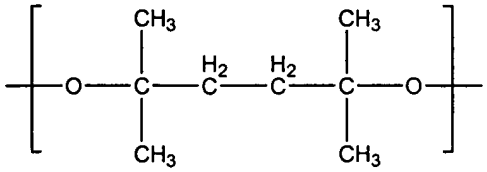
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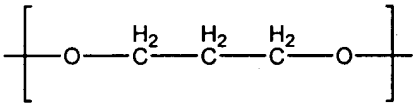
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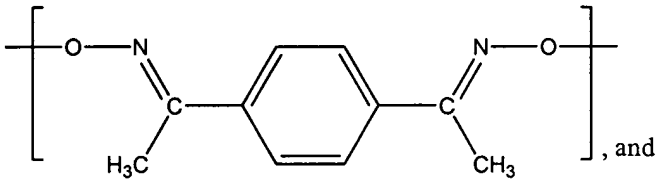
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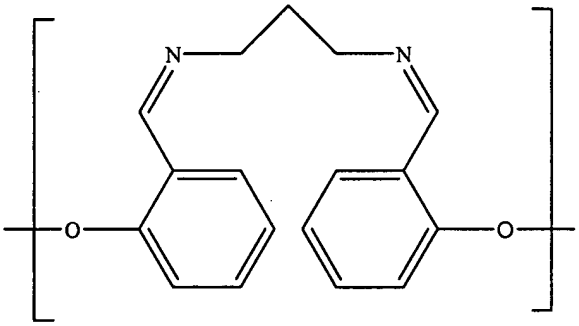
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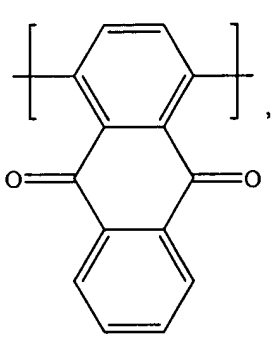
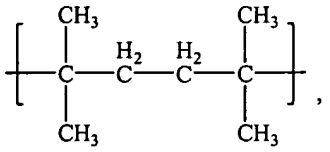
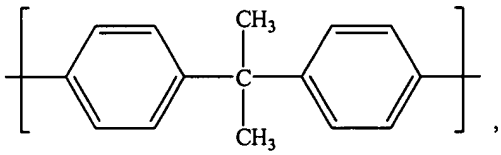
8. (Original) The polymer of claim 1, wherein:

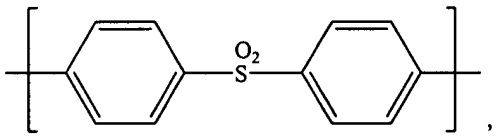
said recurring monomers have the formula (III); and

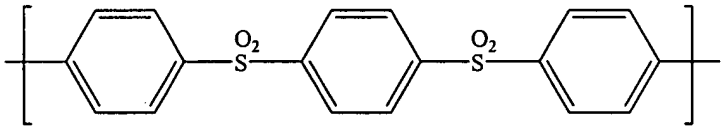
at least one of R^3 and R^4 is selected from the group consisting of

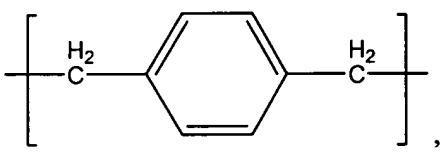








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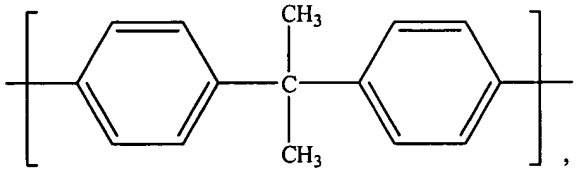
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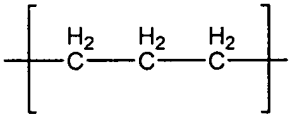
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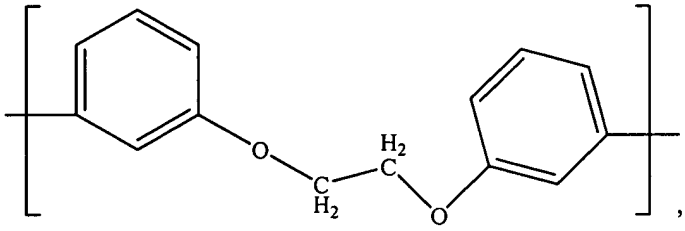
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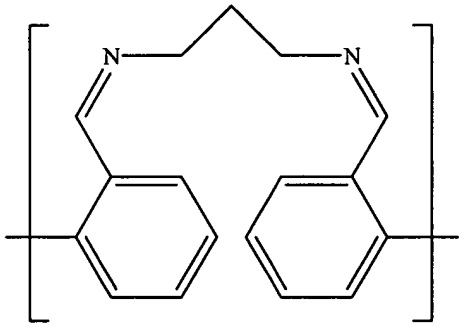
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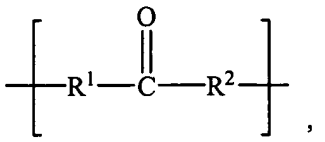
9. (Currently Amended) An anti-reflective composition comprising a polymer dispersed or dissolved in a solvent system, the improvement being that said polymer is selected from the group consisting of ~~polycarbonates;~~ polysulfonyl esters, polycarbonate sulfones, polycarbonates comprising recurring monomers having a formula selected from the group consisting of:

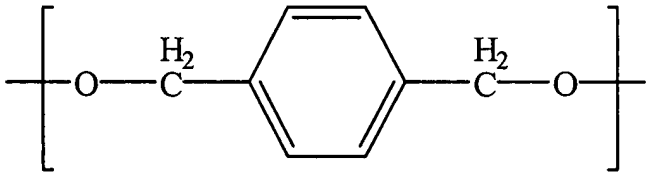
(I) 

where:

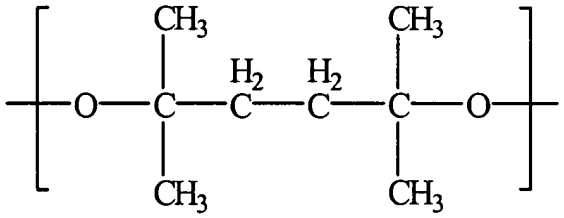
each of R^1 and R^2 is individually selected from the group consisting of functional moieties of diols;

at least one of R^1 and R^2 is selected from the group consisting of functional moieties of the bisphenols; and

when one of R^1 or R^2 is a moiety of bisphenol A, the other of R^1 and R^2 is a group other than



or



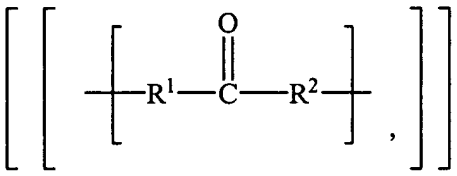
and mixtures ~~thereof~~ of the foregoing.

10. (Original) The composition of claim 9, wherein said composition can be cured or hardened to form an anti-reflective layer which absorbs at least about 80% of light at a wavelength of about 193 nm and at a layer thickness of about 400 Å.

11. (Currently Amended) The composition of claim 9, wherein said polymer has an average molecular weight of from about ~~1,000-100,000~~ 2,000-20,000 Daltons.

12. (Currently Amended) The composition of claim 9, said polymer comprising recurring monomers having a formula selected from the group consisting of:

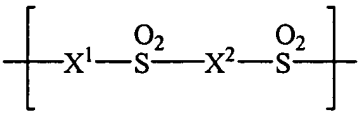
~~(I)~~



~~where:~~

~~each of R^1 and R^2 is individually selected from the group consisting of functional moieties of diols;~~

(II)

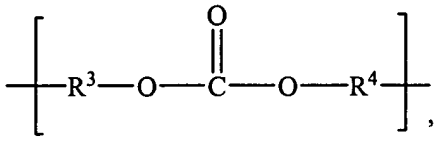


where:

X^1 is selected from the group consisting of functional moieties of diols and dioximes;

X^2 is selected from the group consisting of substituted and unsubstituted aryls and alkyls;

at least one of X^1 and X^2 includes an aromatic group; and

(III) 

where:

each of R^3 and R^4 is individually selected from the group consisting of substituted and unsubstituted aryls and alkyls;

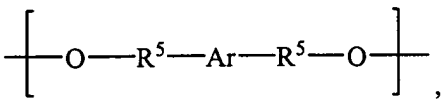
at least one of R^3 and R^4 includes an $-SO_2$ group; and

at least one of R^3 and R^4 includes an aromatic group.

13. (Currently Amended) The composition of claim ~~12~~ 9, wherein said recurring monomers have the formula (I) and at least one of R^1 and R^2 is selected from the group consisting of functional moieties of the bisphenols.

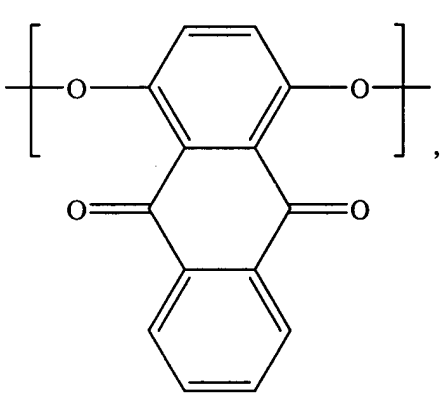
14. (Original) The composition of claim 13, wherein one of R^1 and R^2 is selected from the group consisting of functional moieties of bisphenol P and bisphenol Z.

15. (Original) The composition of claim 14, wherein the other of R^1 and R^2 has the formula



where R^5 is an alkyl group and Ar is an aryl group.

16. (Currently Amended) The composition of claim ~~12~~ 9, wherein said recurring monomers have the formula (I) and one of R^1 and R^2 is selected from the group consisting of



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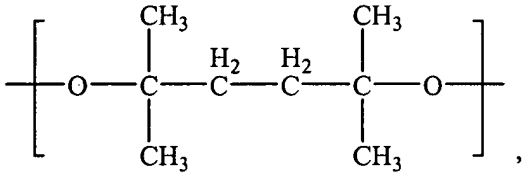

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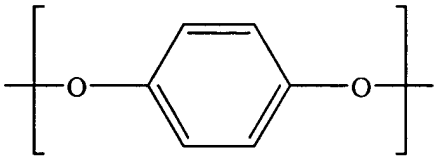

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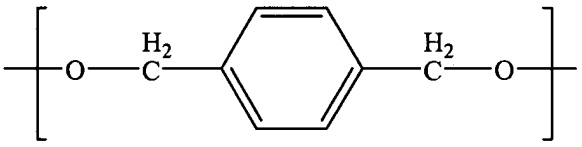
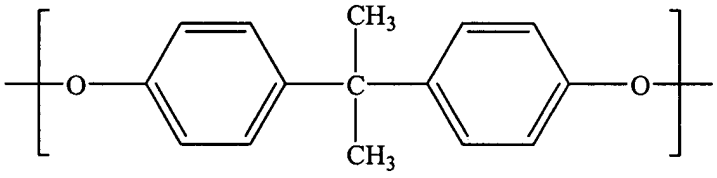


, and



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17. (Original) The composition of claim 12, wherein said recurring monomers have the formula (II) and X^2 is a phenyl group.

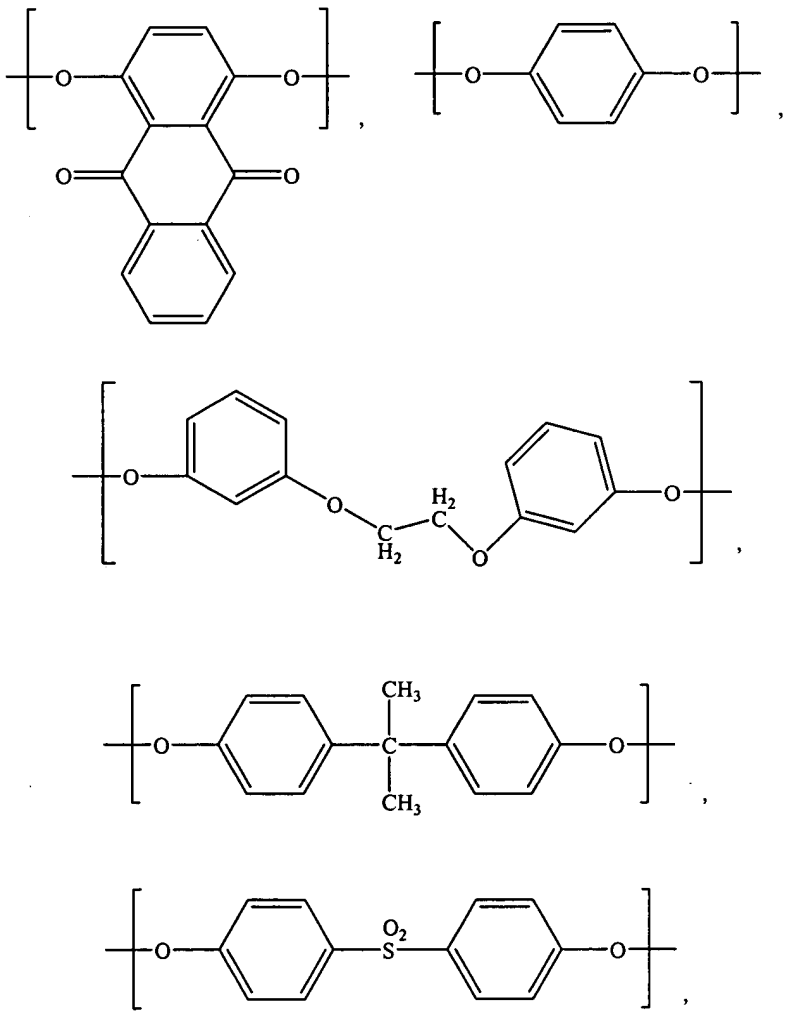
18. (Original) The composition of claim 12, wherein:

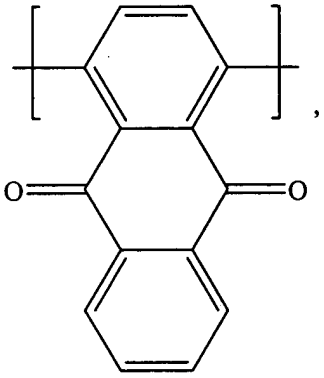
said recurring monomers have the formula (II);

X^1 has the formula -O-Z-O-; and

Z is selected from the group consisting of aryls, alkyls, and combinations thereof.

19. (Original) The composition of claim 18, wherein X^1 has a formula selected from the group consisting of





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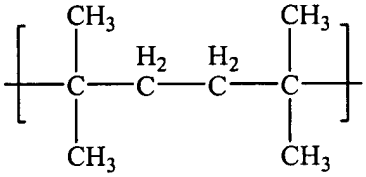

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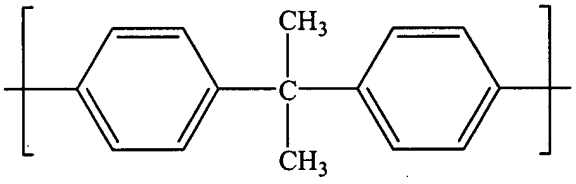

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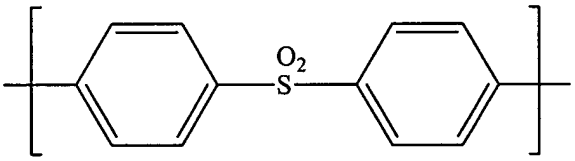

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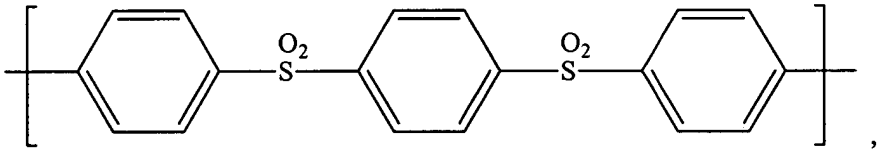

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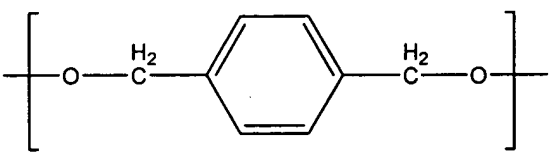
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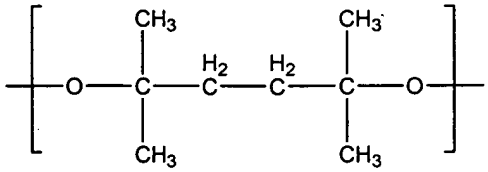
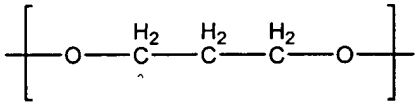

,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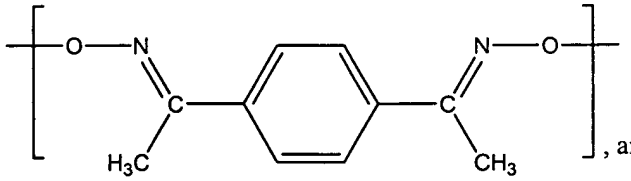
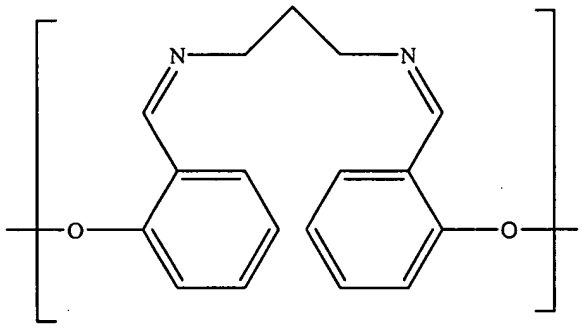
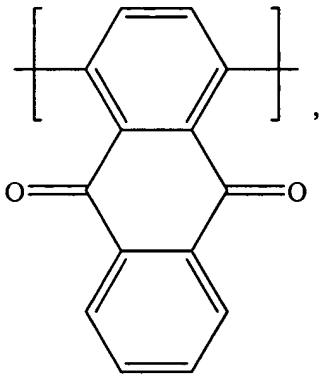

, and

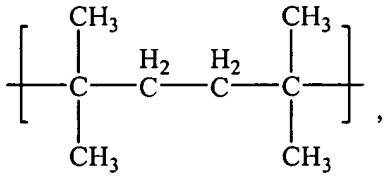

.

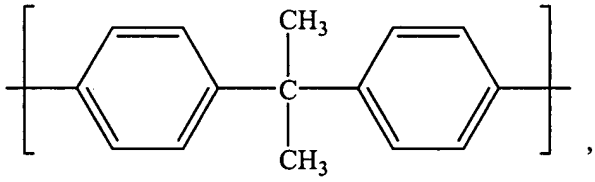
20. (Original) The composition of claim 12, wherein:

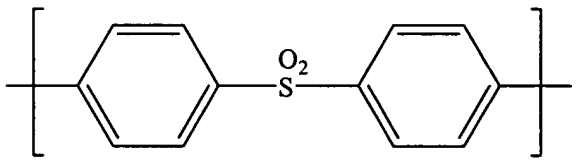
said recurring monomers have the formula (III); and

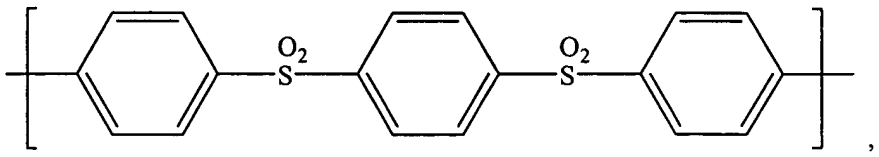
at least one of R^3 and R^4 is selected from the group consisting of

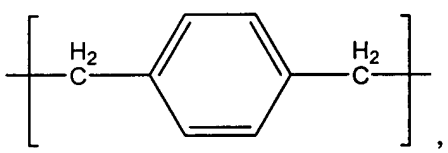








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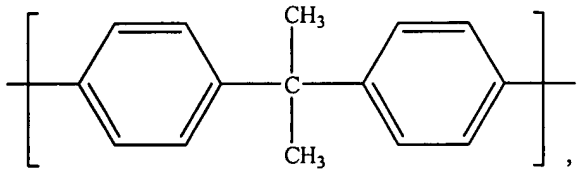
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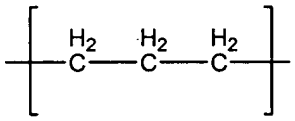
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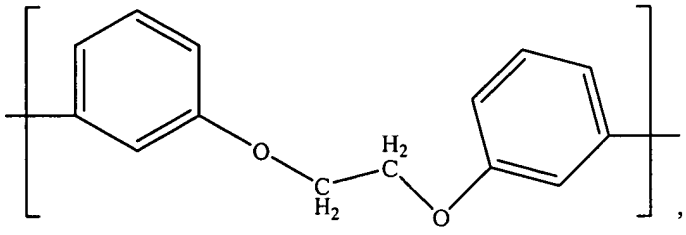
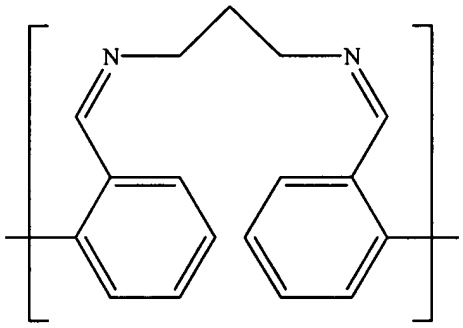
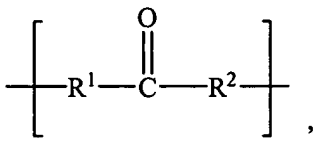

, and


.

21. (Currently Amended) A method of using a composition in photolithographic processes, said method comprising the step of applying a quantity of a composition to a substrate to form a layer thereon, said composition comprising:

a solvent system; and

a polymer dispersed or dissolved in said solvent system, wherein said polymer is selected from the group consisting of ~~polycarbonates,~~ polysulfonyl esters, polycarbonate sulfones, polycarbonates comprising recurring monomers having a formula selected from the group consisting of:

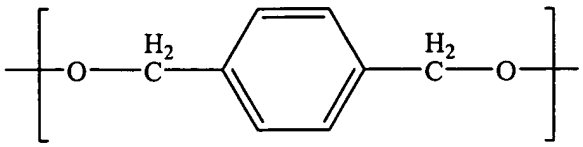
(I)  ,

where:

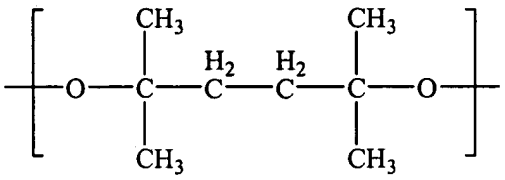
each of R^1 and R^2 is individually selected from the group consisting of functional moieties of diols;

at least one of R^1 and R^2 is selected from the group consisting of functional moieties of the bisphenols; and

when one of R^1 or R^2 is a moiety of bisphenol A, the other of R^1 and R^2 is a group other than



or



and mixtures ~~thereof~~ of the foregoing.

22. (Original) The method of claim 21, wherein said applying step comprises spin-coating said composition onto said substrate surface.

23. (Original) The method of claim 21, wherein said substrate has a hole formed therein, said hole being defined by a bottom wall and sidewalls, and said applying step comprises applying said composition to at least a portion of said bottom wall and sidewalls.

24. (Original) The method of claim 21, further including the step of baking said layer at a temperature of from about 80-180°C to yield a cured or hardened layer.

25. (Original) The method of claim 24, wherein after said baking step, said cured or hardened layer is substantially insoluble in a photoresist developer.

26. (Original) The method of claim 24, further including the step of applying a

photoresist to said cured or hardened layer.

27. (Original) The method of claim 26, furthering including the steps of:
exposing at least a portion of said photoresist to light; and
developing said exposed photoresist.

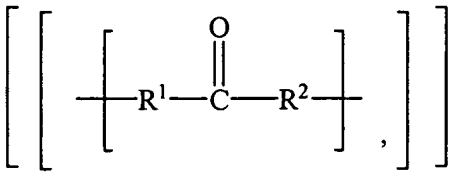
28. (Original) The method of claim 27, wherein said developing step results in the removal of said cured or hardened layer from areas adjacent said exposed photoresist.

29. (Original) The method of claim 28, wherein said developing step comprises contacting said photoresist and said cured or hardened layer with an alkaline developer.

30. (Original) The method of claim 24, further including the step of exposing at least a portion of said cured or hardened layer to light, wherein after said exposing step, said cured or hardened layer is substantially soluble in a photoresist developer.

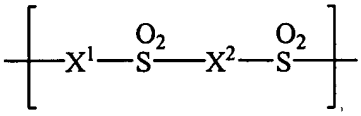
31. (Original) The method of claim 24, wherein said composition to forms an anti-reflective layer which absorbs at least about 80% of light at a wavelength of about 193 nm and at a layer thickness of about 400 Å.

32. (Currently Amended) The method of claim 21, said polymer comprising recurring monomers having a formula selected from the group consisting of:

(I) 

~~where:~~

~~each of R^1 and R^2 is individually selected from the group consisting of functional moieties of diol;~~

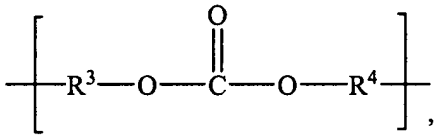
(II) 

where:

X^1 is selected from the group consisting of functional moieties of diols and dioximes;

X^2 is selected from the group consisting of substituted and unsubstituted aryls and alkyls;

at least one of X^1 and X^2 includes an aromatic group; and

(III) 

where:

each of R^3 and R^4 is individually selected from the group consisting of substituted and unsubstituted aryls and alkyls;

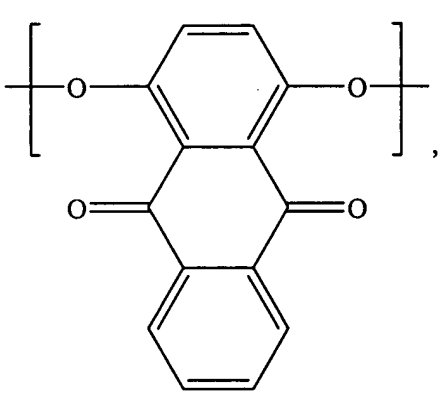
at least one of R^3 and R^4 includes an $-SO_2$ group; and

at least one of R^3 and R^4 includes an aromatic group.

33. (Currently Amended) The method of claim ~~32~~ 21, wherein said recurring monomers

have the formula (I) and at least one of R^1 and R^2 is selected from the group consisting of functional moieties of the bisphenols.

34. (Currently Amended) The method of claim ~~32~~ 21, wherein said recurring monomers have the formula (I) and one of R^1 and R^2 is selected from the group consisting of



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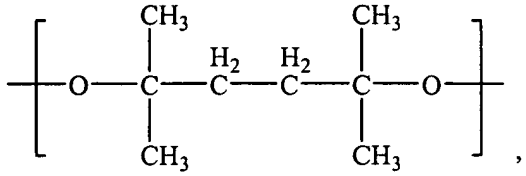

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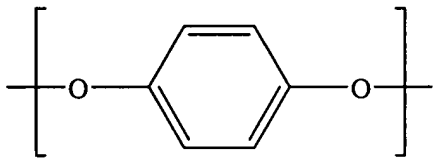

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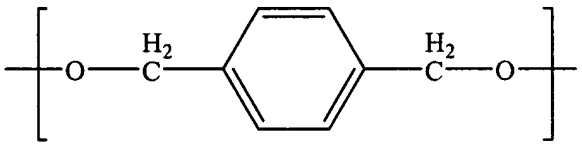
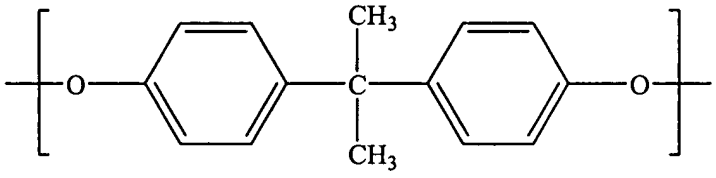


, and



.

35. (Original) The method of claim 32, wherein said recurring monomers have the formula (II) and X^2 is a phenyl group.

36. (Original) The method of claim 32, wherein:

said recurring monomers have the formula (II);

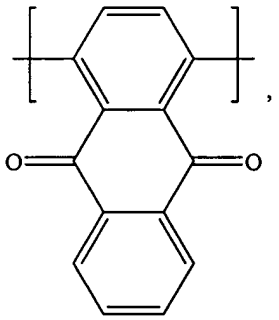
X^1 has the formula -O-Z-O-; and

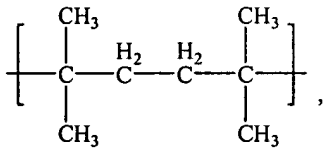
Z is selected from the group consisting of aryls, alkyls, and combinations thereof.

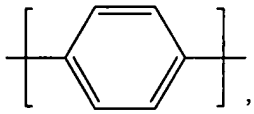
37. (Original) The method of claim 32, wherein:

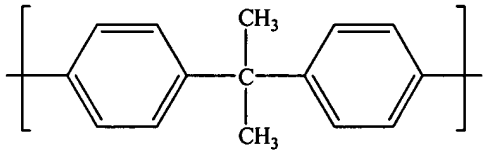
said recurring monomers have the formula (III); and

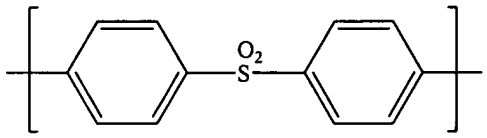
at least one of R^3 and R^4 is selected from the group consisting of

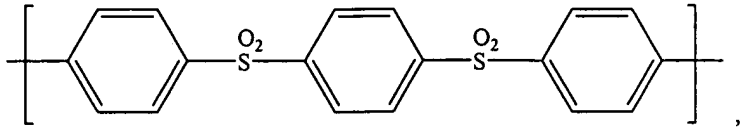


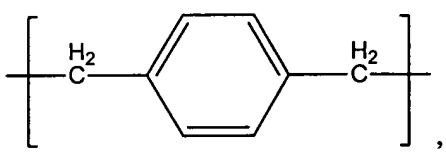








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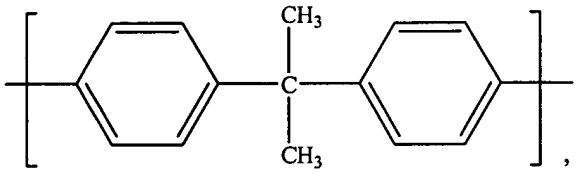
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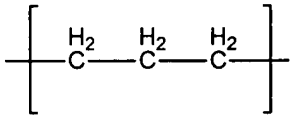
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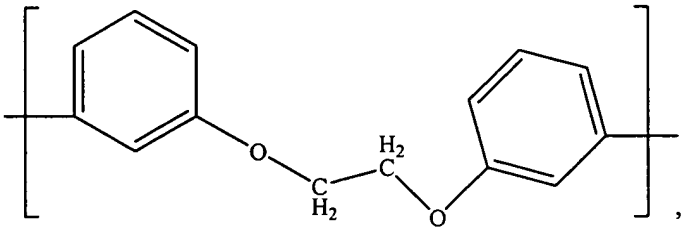
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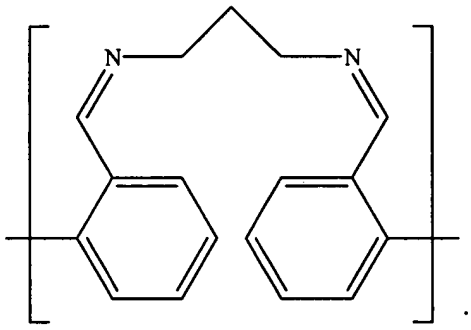
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38. (Original) The method of claim 21, wherein said substrate is selected from the group consisting of silicon, aluminum, tungsten, tungsten silicide, gallium arsenide, germanium, tantalum, SiGe, and tantalum nitride wafers.

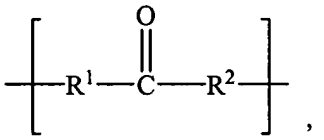
39. (Currently Amended) A precursor structure formed during photolithographic processes, said structure comprising:

a substrate having a surface;

an anti-reflective layer on said substrate surface, said layer being formed from a composition comprising:

a solvent system; and

a polymer dispersed or dissolved in said solvent system, wherein said polymer is selected from the group consisting of ~~polycarbonates,~~ polysulfonyl esters, polycarbonate sulfones, polycarbonates comprising recurring monomers having a formula selected from the group consisting of:

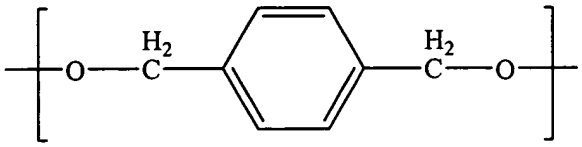
(I)  ,

where:

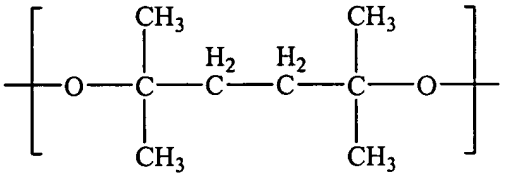
each of R^1 and R^2 is individually selected from the group consisting of functional moieties of diols;

at least one of R^1 and R^2 is selected from the group consisting of functional moieties of the bisphenols; and

when one of R^1 or R^2 is a moiety of bisphenol A, the other of R^1 and R^2 is a group other than



or



and mixtures ~~thereof~~ of the foregoing.

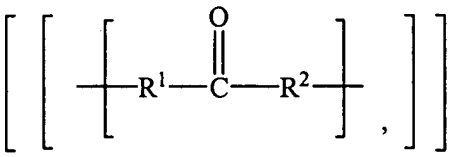
40. (Original) The structure of claim 39, wherein said anti-reflective layer can be cured or hardened to form a layer which is substantially insoluble in a photoresist developer.

41. (Original) The structure of claim 39, further including a photoresist adjacent said anti-reflective layer.

42. (Original) The structure of claim 39, wherein said composition can be cured or hardened to form an anti-reflective layer which absorbs at least about 80% of light at a wavelength of about 193 nm and at a layer thickness of about 400 Å.

43. (Currently Amended) The structure of claim 39, said polymer comprising recurring monomers having a formula selected from the group consisting of:

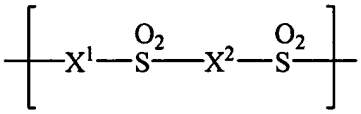
~~(I)~~



~~where:~~

~~each of R^1 and R^2 is individually selected from the group consisting of functional moieties of diols;~~

(II)



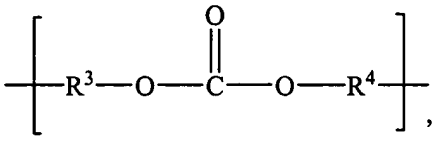
where:

X^1 is selected from the group consisting of functional moieties of diols and dioximes;

X^2 is selected from the group consisting of substituted and unsubstituted aryls and alkyls;

at least one of X^1 and X^2 includes an aromatic group; and

(III)



where:

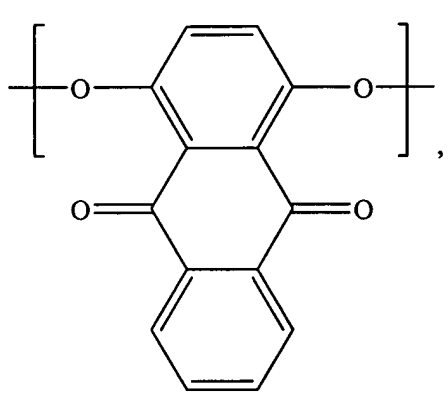
each of R^3 and R^4 is individually selected from the group consisting of substituted and unsubstituted aryls and alkyls;

at least one of R^3 and R^4 includes an $-SO_2$ group; and

at least one of R^3 and R^4 includes an aromatic group.

44. (Currently Amended) The structure of claim ~~43~~ 39, wherein said recurring monomers have the formula (I) and at least one of R^1 and R^2 is selected from the group consisting of functional moieties of the bisphenols.

45. (Currently Amended) The structure of claim ~~43~~ 39, wherein said recurring monomers have the formula (I) and one of R^1 and R^2 is selected from the group consisting of



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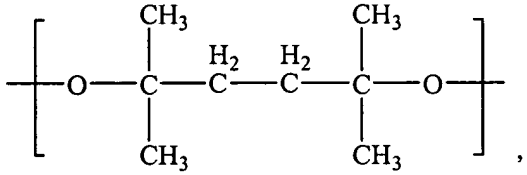

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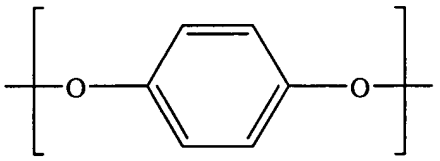

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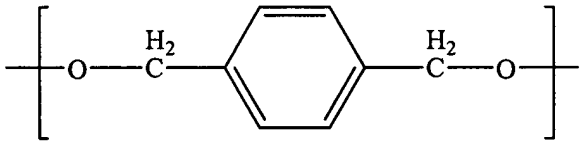
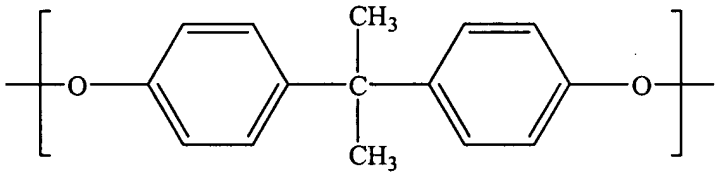


, and



.

46. (Original) The structure of claim 43, wherein said recurring monomers have the formula (II) and X^2 is a phenyl group.

47. (Original) The structure of claim 43, wherein:

said recurring monomers have the formula (II);

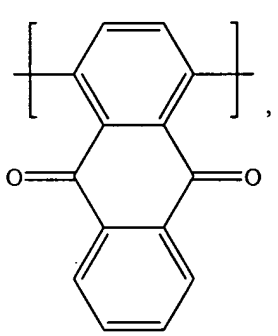
X^1 has the formula -O-Z-O-; and

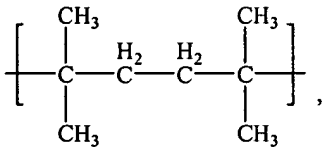
Z is selected from the group consisting of aryls, alkyls, and combinations thereof.

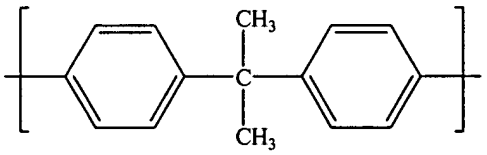
48. (Original) The structure of claim 43, wherein:

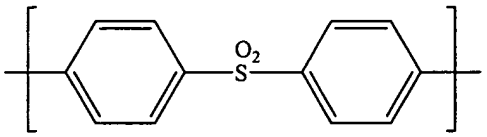
said recurring monomers have the formula (III); and

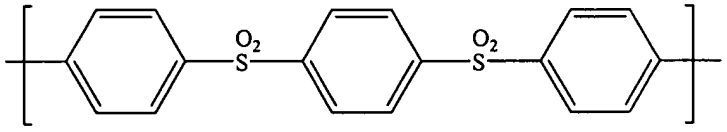
at least one of R^3 and R^4 is selected from the group consisting of

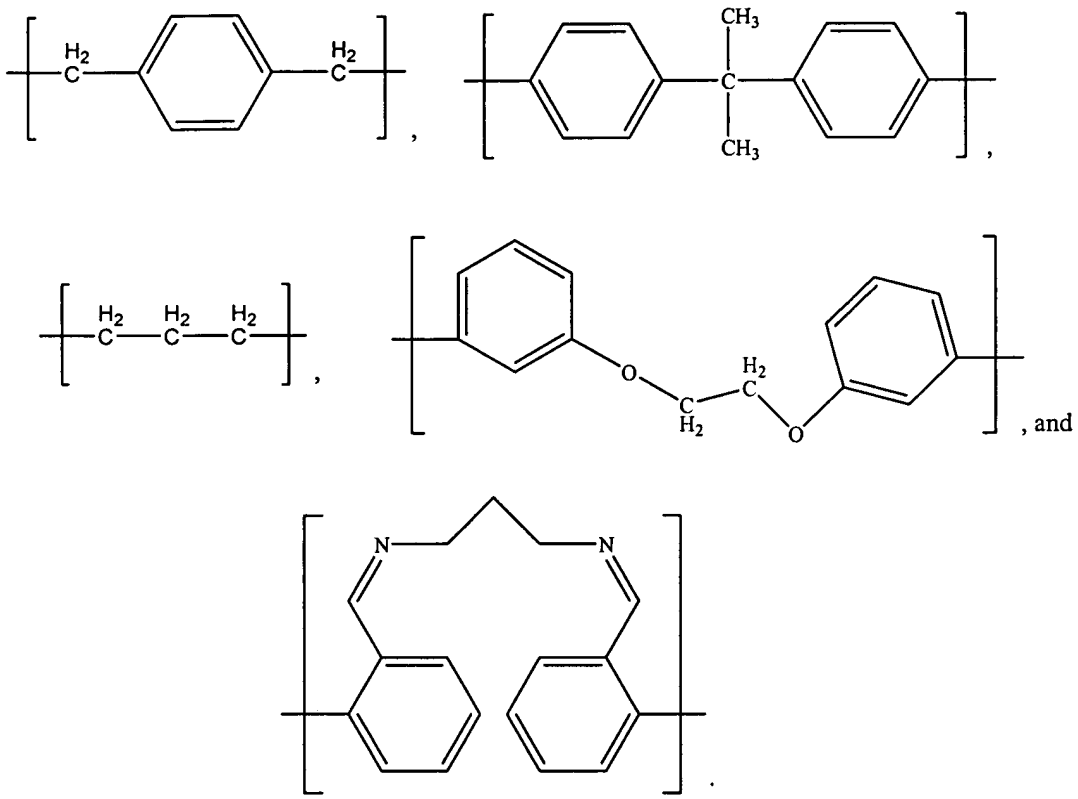










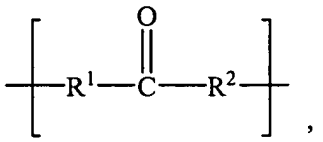


, and

.

49. (Original) The structure of claim 43, wherein said substrate is selected from the group consisting of silicon, aluminum, tungsten, tungsten silicide, gallium arsenide, germanium, tantalum, SiGe, and tantalum nitride wafers.

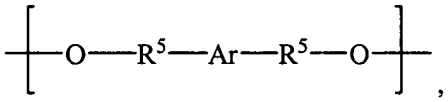
50. (New) A polymer comprising recurring monomers having the formula

(I)  ,

where:

one of R^1 and R^2 is selected from the group consisting of functional moieties of bisphenol Z; and

the other of R^1 and R^2 has the formula

 ,

where R^5 is an alkyl group and Ar is an aryl group.

51. (New) The polymer of claim 50, wherein R^5 is a C_1-C_{12} alkyl group and Ar is a C_4-C_{12} aryl group.

52. (New) An anti-reflective composition comprising a polymer dispersed or dissolved in a solvent system, the improvement being that said polymer is selected from the group consisting of polycarbonates, polysulfonyl esters, polycarbonate sulfones, and mixtures thereof, said polymer having an average molecular weight of from about 2,000-20,000 Daltons.

53. (New) A method of using a composition in photolithographic processes, said method comprising the step of applying a quantity of a composition to a substrate to form a layer thereon, said composition comprising:

a solvent system; and

a polymer dispersed or dissolved in said solvent system, wherein said polymer is selected from the group consisting of polycarbonates, polysulfonyl esters, polycarbonate sulfones, and mixtures thereof, said polymer having an average molecular weight of from about 2,000-20,000 Daltons.

54. (New) The method of claim 53, further comprising the step of baking said layer to yield a cured or hardened layer.

55. (New) The method of claim 54, further including the step of exposing at least a portion of said cured or hardened layer to light, wherein after said exposing step said cured or hardened layer is substantially soluble in a photoresist developer.

56. (New) The method of claim 55, wherein prior to said exposing step, said cured or hardened layer is substantially insoluble in a photoresist developer.

57. (New) The method of claim 53, wherein said substrate is selected from the group consisting of silicon, aluminum, tungsten, tungsten silicide, gallium arsenide, germanium, tantalum, SiGe, and tantalum nitride wafers.

58. (New) A precursor structure formed during photolithographic processes, said structure comprising:

a substrate having a surface;

an anti-reflective layer on said substrate surface, said layer being formed from a composition comprising:

a solvent system; and

a polymer dispersed or dissolved in said solvent system, wherein said polymer is selected from the group consisting of polycarbonates, polysulfonyl esters, polycarbonate sulfones, and mixtures thereof, said polymer having an average molecular weight of from about 2,000-20,000 Daltons.

59. (New) The method of claim 58, wherein said substrate is selected from the group consisting of silicon, aluminum, tungsten, tungsten silicide, gallium arsenide, germanium, tantalum, SiGe, and tantalum nitride wafers.